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ABSTRACT

The variance in adult learner needs requires that adult education classes provide individualized instruction for the adult learner--a time-consuming and intellectually challenging task. To assist in this difficult undertaking, the East Carroll Parish (Louisiana) Adult Education Program developed mathematics tutorial exercises corresponding to the California Achievement Tests, Levels 14-19. The exercises were pilot tested, revised, and finalized. All skill exercises contained tutorial statements for self-help in the software system. The content of the software system contained the following strands: operations, concepts and numeration, ratio, proportion, percent, geometry, measurement, statistics, probability, graphs, integers, and prealgebra. The system contained approximately 150 skills and more than 3,000 skill exercises. These materials were compiled on a series of 18 computer diskettes that are Apple-compatible. Used with a resource teacher, the program has the potential to be successful with adult students. (KC)

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THE DEVELOPMENT OF A SOFTWARE DELIVERY SYSTEM FOR
SELECTED MATHEMATICS SKILLS FOR
THE EAST CARROLL PARISH ADULT EDUCATION PROGRAM

East Carroll Parish School Board
Lake Providence, Louisiana

State Board of Elementary and Secondary Education Grant
ABE-7-87

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Final Report

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THE DEVELOPMENT OF A SOFTWARE DELIVERY SYSTEM FOR
SELECTED MATHEMATICS SKILLS FOR
THE EAST CARROLL PARISH ADULT EDUCATION PROGRAM

ABSTRACT

A software delivery system comprised of mathematics exercises corresponding to the program content of the California Achievement Tests, Levels 14 through 19 was developed, pilot tested, revised, and finalized in the proposed project. All skill exercises contained tutorial statements for self-help in the software system. The content of the software system contained the following strands: Operations, concepts and numeration, ratio, proportion, percent, geometry, measurement, statistics, probability, graphs, intergers, and pre-algebra. The system contained approximately 150 skills and over 3000 skill exercises. These materials were compiled on a series of 18 computer diskettes.

PURPOSE OF PROJECT

The variance of adult learner needs requires that adult education classes provide individualized instruction for the adult learner. This is a time consuming task as well as intellectually challenging. To provide instruction in all areas of mathematics, reading, and language arts skills over a six (6) year or greater span for 10 to 25 adult learners is a challenge many instructors are reluctant to take. Just the record keeping associated with such a task is a large undertaking. To assist in this difficult undertaking, the East Carroll Parish Adult Education Program has developed mathematics tutorial exercises corresponding to the California Achievement Tests, Levels 14 through 19. In addition, the software delivery system to run all the mathematics skill exercises has been developed. The software system is Apple compatible and has been incorporated into 18 computer diskettes.

EXTENT TO WHICH THE OBJECTIVES OF THE PROJECT HAVE BEEN ACCOMPLISHED

The final evaluation report will document the status of the nine project activity goals (objectives). Each goal (objective) will be presented followed by a short narrative relating to the accomplishment/non-accomplishment of the goal (objective).

Activity Goal #1

To develop a project management plan.

Accomplished

The project management plan was developed on schedule and submitted to the parish assistant superintendent. The sequence of activities leading to the completion of the project management plan follows:

Mathematics Software	Management Systems	Systems Document CWA-1
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SUBJECT: System for developing the Project Management Plan

Responsibility

Action

Project Curriculum
Specialists

1. Review management objective requirements and project proposal

Project Curriculum
Specialists

2. Develop in MBO format the following items:
 - a. Project learner goals
 - b. Project activity goals
 - c. Project Administrative Organizational Chart
 - d. Project Process Objectives
 - e. Project Critical Work
 - f. Project Critical Work Activity Systems
 - g. Monitoring Systems

Project Consultant
Secretary

3. Type, edit, and finalize the draft Project Management Plan

- | | |
|--|--|
| Project Curriculum Specialist | 4. Contact parish assistant superintendent to schedule meeting |
| Parish Assistant Superintendent | 5. Review work schedule, agree on meeting date, time and place |
| Project Curriculum Specialists/Parish Assistant Superintendent | 6. Meet to review initial draft of the Project Management Plan, document any needed revisions |
| Project Curriculum Specialists/Project Consultant Secretary | 7. Revise the Project Management Plan as needed, prepare copies of revised materials and mail to parish assistant superintendent |
| Parish Assistant Superintendent | 8. Review the finalized Project Management Plan and maintain for project use |
| Parish Assistant Superintendent | 9. File one copy of Plan for project documentation |

Activity Goal #2

To develop a selected mathematics content structure of skills.

Accomplished

The mathematics program structure was developed on schedule. The following actions were completed. The program structure follows the action plan.

Mathematics Software	Management Systems	Systems Document CWA-2
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SUBJECT: System for developing a mathematics content structure of skills

Responsibility

Action

- | | |
|--|--|
| Project Curriculum Specialists | 1. Review adult education mathematics skills structures and prepare draft copies of possible content structure |
| Project Curriculum Specialists | 2. Contact parish to schedule meeting |
| Parish Assistant Superintendent | 3. Review work schedule, agree on meeting date, time and place |
| Project Curriculum Specialists/Parish Assistant Superintendent | 4. Meet, review prepared materials, develop mathematics content structure of skills |

Project Consultant
Secretary

Project Curriculum
Specialists/Project
Consultant Secretary

Parish Assistant
Superintendent

Project Curriculum
Specialist/Project Consultant
Secretary

Parish Assistant
Superintendent

5. Prepare draft (typed) copies of mathematics content structure of skills
6. Edit, finalize, and mail to parish assistant superintendent
7. Review content structure, if revised, mail changes to project curriculum specialist; if no changes, notify project curriculum specialist of acceptance
8. If needed, complete requested changes on content structure and mail to parish supervisor (ABE)
9. File finalized mathematics content structure of skills

MATHEMATICS PROGRAM STRUCTURE

I. Operations

A. Whole Number Operations

1. Addition
 - a. Addition combinations of 2 digits by 2 digits through 8 digits by 8 digits
 - b. Column addition involving up to 5 addends with values up to 8 digits
2. Subtraction
 - a. Subtraction combinations from facts through 3 digits by 3 digits
 - b. Subtraction combinations of minuends to 7 digits, any subtrahend to 7 digits
 - c. Combination of addition and subtraction with use of parentheses (), values through 4 digits
3. Multiplication
 - a. Multiply any combination of values to 3 digits by 3 digits
 - b. Multiply any combination of values to 4 digits by 4 digits
 - c. Multiply by using exponential notation
4. Division
 - a. Dividing all combinations, up to 5-digit dividend by 1- or 2-digit divisor
 - b. Dividing all combinations, up to 6-digit dividend by 3-digit divisor

B. Fraction Operations

1. Addition
 - a. Addition of two or more simple and mixed fractions with like denominators
 - b. Addition of two or more simple fractions with unlike denominators
 - c. Addition of two or more mixed fractions with unlike denominators
2. Subtraction
 - a. Subtraction of simple and mixed fractions with like denominators
 - b. Subtraction of simple fractions with unlike denominators
 - c. Subtraction of a simple fraction from a mixed fraction and from a whole number, unlike denominators

I. Operations (continued)

B. Fraction Operations

3. Multiplication

- a. Multiplying two or more simple fractions
- b. Multiplying a whole number by a simple fraction, a mixed fraction by a simple fraction, a whole number by a mixed fraction, and a mixed fraction by a mixed fraction

4. Division

- a. Dividing a simple fraction by a simple fraction
- b. Dividing: mixed fraction by simple fraction, simple fraction by mixed fraction, whole number by simple fraction, simple fraction by whole number, and mixed fraction by mixed fraction.

C. Decimal Operations

1. Addition

- a. Addition of any two decimals including mixed decimals
- b. Addition of more than two decimals and/or mixed decimals, any combination

2. Subtraction

- a. Subtraction of any two decimals including mixed decimals

3. Multiplication

- a. Multiply a whole number by a decimal and a decimal by a whole number
- b. Multiply any two decimals, all combinations
- c. Multiply any two mixed decimals, all combinations

4. Division

- a. Dividing whole number and decimal combinations
- b. Dividing all combinations of decimals and decimal fractions

II. Concepts and Numeration

A. Concepts

1. Fractions

- a. Rename fractions to equivalent values
- b. Rename fractions to lowest terms

II. Concepts and Numeration (continued)

A. Concepts

1. Fractions

- c. Rename improper fractions to mixed fractions, rename mixed fractions to improper fractions
- d. Comparing fractions, greater than and less than
- e. Ordering fractions, simple and mixed
- f. Identify the least common multiple of two or more numbers
- g. Find the fractional part of a whole number
- h. Identify the greatest common factor of two or more numbers
- i. Identify the prime factorization of given values
- j. Identify the reciprocal of given values

2. Decimals

- a. Identify decimal place value through millionths
- b. Identify the sequential order of decimals through ten-thousandths
- c. Identify greater than ($>$) and less than ($<$) decimal values through ten-thousandths
- d. Round decimals to the nearest tenth, hundredth, and thousandth
- e. Identify terminating, repeating, and non-terminating decimals

3. Fractions and Decimals

- a. Identify an equivalent fraction for any decimal
- b. Identify an equivalent decimal for any fraction
- c. Identify an equivalent decimal for any mixed fraction
- d. Identify an equivalent mixed fraction for any decimal

B. Numeration

1. Place Value

- a. Identify whole number place value through hundred trillion
- b. Identify decimal place value through millionths

2. Number Sequence

- a. Identify greater than ($>$) and less than ($<$) values: whole numbers, fractions, decimals, and integers
- b. Identify sequential order: fractions, decimals, and integers

II. Concepts and Numeration (continued)

B. Numeration

3. Rounding
 - a. Identify rounded off values to millions (whole numbers)
 - b. Identify rounded off values to tenths, hundredths, and thousandths (decimals)
4. Roman Numerals
 - a. Identify Roman numerals for whole numbers
 - b. Identify whole numbers for Roman numerals
5. Exponential Notation
 - a. Identify exponential notation for given values
 - b. Identify values for given exponential notation
 - c. Find products of exponents
6. Scientific Notation
 - a. Identify scientific notation for given value
 - b. Identify value for given scientific notation

C. Properties

1. Identify Addition and Multiplication Properties
2. Identify Prime and Composite Numbers
3. Identify the Prime Factorization of a Given Value
4. Identify the Greatest Common Factor of Two or More Numbers
5. Identify the Least Common Multiple of Two or More Numbers
6. Identify the Absolute Value of Given Numbers
7. Identify the Square and the Square Root of Given Values

III. Ratio, Proportion, and Percent

A. Ratio

1. Identify a Ratio as a Fraction
2. Identify Equivalent Ratios

B. Proportion

1. Identify the Missing Term of a Proportion

III. Ratio, Proportion, and Percent (continued)

C. Percent

1. Identify the Percent Equivalent for Given Fractions, Decimals, and Ratios
2. Identify Fraction, Decimal, and Ratio Equivalents for Given Percents
3. Find the Percent of a Number
4. Find the Number When a Percent of It is Known
5. Find What Percent One Number is of Another Number

IV. Geometry

A. Lines

1. Identify Parallel, Perpendicular, Skew, and Transversal Lines
2. Identify Lines of Symmetry

B. Angles

1. Identify Acute, Right, and Obtuse Angles
2. Identify Complementary and Supplementary Angles
3. Calculate Measure of Angles

C. Figures

1. Classify Triangles According to Angles: Acute, Right, Obtuse
2. Classify Triangles According to Sides: Equilateral, Isosceles, Scalene
3. Identify Quadrilaterals: Trapezoids, Parallelograms, Rhombus, Rectangle, Square
4. Identify Polygons: Triangle, Quadrilateral, Pentagon, Hexagon, Heptagon, Octagon, Nonagon, Decagon
5. Identify Congruent Triangles
6. Identify Similar Triangles
7. Identify Congruent Figures by Angles, Segments
8. Identify Polyhedrons (Space Figures): Triangular Prism, Cube, Hexagonal Prism, Triangular Pyramid, Rectangular Pyramid, Pentagonal Pyramid, Hexagonal Pyramid, Cylinder, Cone, Sphere, Octahedron

IV. Geometry (continued)

D. Perimeter

1. Calculate for any figure, given formula

E. Circumference

1. Calculate, given formula

F. Area

1. Rectangle, Calculate Using Formula
2. Parallelogram, Calculate Using Formula
3. Triangle, Calculate Using Formula
4. Trapezoid, Calculate Using Formula
5. Circle, Calculate Using Formula

G. Surface Area

1. Rectangular Prism, Calculate Using Formula
2. Cube, Calculate Using Formula
3. Pyramid, Calculate Using Formula
4. Cylinder, Calculate Using Formula
5. Cone, Calculate Using Formula
6. Sphere, Calculate Using Formula

H. Volume

1. Rectangular Prism, Calculate Using Formula
2. Cube, Calculate Using Formula
3. Pyramid, Calculate Using Formula
4. Cylinder, Calculate Using Formula
5. Cone, Calculate Using Formula
6. Sphere, Calculate Using Formula

I. Rule of Pythagorean

V. Measurement

A. Time

1. Add and Subtract Units
2. Use Time Zones

B. Money

1. Add, Subtract, Multiply, and Divide Units of Money
2. Calculate Simple Interest
3. Calculate Discount and Sale Price
4. Calculate Sales Tax
5. Calculate Compound Interest

C. Linear

1. Convert All English Units
2. Convert All Metric Units

D. Capacity

1. Convert All English Units
2. Convert All Metric Units

E. Weight

1. Convert All English Units
2. Convert All Metric Units

F. Temperature

1. Read Fahrenheit Scale
2. Read Celsius Scale
3. Read Kelvin Scale

VI. Statistics, Probability, and Graphs

A. Statistics

1. Calculate the Mean, Median, and Mode
2. Calculate the Frequency and Range

VI. Statistics, Probability, and Graphs (continued)

B. Probability

1. Calculate Equally Alike Outcomes
2. Use the Counting Principle
3. Calculate Permutations
4. Calculate Combinations
5. Calculate Factorials
6. Calculate Independent and Dependent Events

C. Graphs

1. Interpret Bar Graphs
2. Interpret Circle Graphs
3. Interpret Line Graphs
4. Interpret Histograms
5. Plotting Points
6. Graphing Simple Equations

VII. Problem Solving/Applications

A. One- and Two-Step Problems

1. Whole Number Operations: Addition, Subtraction, Multiplication, and Division
2. Fraction Operations: Addition, Subtraction, Multiplication, and Division
3. Decimal Operations: Addition, Subtraction, Multiplication, and Division
4. Concepts: Place Value and Rounding
5. Percents

VIII. Integers

A. Compare Integers

B. Order Integers

C. Identify Properties

VIII. Integers (continued)

D. Addition

1. Like Signs
2. Unlike Signs

E. Subtraction

1. Like Signs
2. Unlike Signs

F. Multiplication

1. Like Signs
2. Unlike Signs

G. Division

1. Like Signs
2. Unlike Signs

H. Plotting Coordinates

I. Graphing Simple Equations

IX. Pre-Algebra

A. Evaluating Equations

1. Whole Number Equations
2. Integer Equations

B. Two-Step Equations

Activity Goal #3

To select and acquire a hardware system compatible with project resources and parish requirements.

Accomplished

The system of actions proposed for activity goal #3 follows. The actual action steps varied from the proposed steps but were completed in April, 1987.

Mathematics Software	Management Systems	Systems Document CWA-3
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SUBJECT: System for selecting and acquiring a computer hardware system

Responsibility	Action
Parish Assistant Superintendent	1. Contact computer sales representatives and schedule informational meetings to select computer hardware
Parish Assistant Superintendent	2. Acquire literature on micro-computer systems (Apple compatible)
Parish Assistant Superintendent	3. Discuss computer needs with parish educational personnel
Parish Assistant Superintendent	4. Review all data on micro-computer systems and decide on system for project (Apple compatible)
Parish Assistant Superintendent	5. Complete order for selected computer equipment (Apple compatible system)
Parish Assistant Superintendent	6. Receive equipment and make operational
Parish Assistant Superintendent	7. File copy of purchase orders to document selection and purchases of computer hardware system

Activity Goal #4

To develop tutorial skill exercises corresponding one-to-one with the selected mathematics content structure of skills.

Accomplished

The projected developmental sequence of actions follow. All items have been developed, edited, "tried-out", revised as necessary, re-edited, and entered in the software delivery system. However, the developmental process was far more extensive than originally conceived. The developed data filled 18 floppy disks.

Mathematics Software	Management Systems	Systems Document CWA-4
-------------------------	--------------------	---------------------------

SUBJECT: System for developing tutorial exercises corresponding one-to-one with the content structure of skills

Responsibility	Action
Project Curriculum Specialists	1. Review finalized content structure and collect related instructional materials
Curriculum Specialists/ Measurement Specialists	2. Develop all items for Whole Number Operations items into software program
Data Entry Specialists	3. Complete entry of all Whole Number Operations data, mail to parish assistant superintendent for content review
Data Entry Specialists/ Secretary	4. Print out Whole Number Operations data, mail to parish assistant superintendent for content review
Curriculum Specialist/ Measurement Specialists	5. Develop all items for Numeration and Mathematical Concepts
Data Entry Specialists	6. Complete entry of all Numeration and Concepts data into software program
Data Entry Specialists/ Secretary	7. Print out Numeration and Concepts data, mail to parish assistant superintendent for content review

Curriculum Specialists/
Measurement Specialists

Data Entry Specialists

Data Entry Specialists/
Secretary

Curriculum Specialists/
Measurement Specialists

Data Entry Specialists

Data Entry Specialists/
Secretary

Curriculum Specialists/
Measurement Specialists

Data Entry Specialists

Data Entry Specialists/
Secretary

Curriculum Specialists/
Measurement Specialists

Data Entry Specialists

Data Entry Specialists

Parish Assistant Superintendent

8. Develop all items for Decimals and Decimal Operations
9. Complete entry of all Decimals and Decimal Operations items into software program
10. Print out Decimals and Decimal Operations data, mail to parish assistant superintendent for content review
11. Develop all items for Fractions and Fraction Operations
12. Complete entry of all Fraction and Fraction Operations items into software program
13. Print out Fraction and Fraction Operations data, mail to parish assistant superintendent for content review
14. Develop all items for Ratio, Proportion and Percents
15. Complete entry of all Ratio, Proportion and Percent items into software program
16. Print out Ratio, Proportion and Percents data, mail to parish assistant superintendent for content review
17. Develop all items for Measurement, Geometry, and Problem Solving
18. Complete entry of all Measurement, Geometry, and Problem Solving items ~~into software program~~
19. Print out Measurement, Geometry, and Problem Solving data, mail to parish assistant superintendent for content review
20. Review and critique content items as received, return with corrections and/or approved to the project curriculum specialists.

Project Curriculum Specialists/
Measurement Specialists

Project Consultant Secretary

Parish Assistant Superintendent

21. Review critiqued and/or approved content materials as received, revise as indicated and re-enter into software program
22. Mail set of completed software disks to parish assistant superintendent
23. File finalized software disks to document the development of mathematical tutorial exercises

Activity Goal #5

To develop software compatible with the selected hardware system and the basic requirements of computer assisted instruction.

Accomplished

The authoring software system was developed and finalized by December 1, 1986. This system was required before any data entry could be accomplished. The action for the development of the system follows.

Mathematics Software	Management Systems	Systems Document CWA-5
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SUBJECT: System for developing computer assisted instruction software compatible with the selected hardware system

Responsibility

Action

Assistant Superintendent

1. Decide on general type of hardware and notify project systems analyst (Apple compatible)

Project Systems Analyst

2. Review characteristics of CAI with project director, determine if any special considerations are required

Project Systems Analyst

3. Develop flow chart of software program

Project Systems Analyst and
Programmers

Project Systems Analyst and
Programmers

Project Systems Analyst and
Programmers

Project Systems Analyst and
Programmers

Parish Assistant Superintendent

4. Initiate programming

5. Complete initial program

6. Initiate "de-bugging" of pro-
gram using tutorial exercises

7. Finalize CAI software program
and develop complete documentation

8. File CAI software program

Activity Goal #6

To enter all developed data into the software delivery system.

Accomplished

All data has been developed, edited, "tried-out", revised as necessary, re-edited and entered into the software delivery system. Final data entry of material was completed in late May, 1987. The editing and data entry tasks were much larger tasks than originally planned.

Mathematics Software	Management Systems	Systems Document CWA-6
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SUBJECT: System for entering all developed data into the software delivery system

Responsibility

Action

Project Systems Analyst

1. Finalize all CAI characteristics
and data entry procedures

Data Entry Specialists

2. Complete entry of Whole Number
Operations data into software
program

Curriculum Specialists/
Measurement Specialists/Data
Entry Specialists

3. Edit Whole Number Operations, com-
plete corrections

Data Entry Specialists

Curriculum Specialists/
Measurement Specialists/Data
Entry Specialists

Data Entry Specialists

Curriculum Specialists/
Measurement Specialists/Data
Entry Specialists

Data Entry Specialists

Curriculum Specialists/
Measurement Specialists/Data
Entry Specialists

Data Entry Specialists

Curriculum Specialists/
Measurement Specialists/Data
Entry Specialists

Data Entry Specialists

Curriculum Specialists/
Measurement Specialists/Data
Entry Specialists

Data Entry Specialists/
Curriculum Specialists

Parish Assistant Superintendent

4. Complete entry of Numeration and Concepts data into software program
5. Edit Numeration and Concepts data, complete corrections
6. Complete entry of Fraction and Fraction Operations data into software program
7. Edit Fraction and Fraction Operations data, complete corrections
8. Complete entry of Decimal and Decimal Operations data into software program
9. Edit Decimal and Decimal Operations data, complete corrections
10. Complete entry of Ratio, Proportion, and Percents data into software program
11. Edit Ratio, Proportion, and Percents data, complete corrections
12. Complete entry of Measurement, Geometry, and Problem Solving data into software program
13. Edit Measurement, Geometry, and Problem Solving data, complete corrections
14. Finalize all data entries for content exercises on software disks; submit to parish assistant superintendent
15. File copies of all prepared software disks

Activity Goal #7

To field test the developed software and hardware system.

Accomplished

All the software was field-tested , developed and data entered.

This process was not completed until late May, 1987. Project

personnel validated the operational status of the hardware upon receipt and setup.

Mathematics Software	Management Systems	Systems Document CWA-7
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SUBJECT: System for field testing the developed software and hardware systems

Responsibility	Action
Parish Assistant Superintendent	1. In-service adult education instructor on use of developed software system with purchased hardware
Adult Education Instructor(s)	2. Initiate individualized instruction using developed software with adult education learners
Adult Education Instructor(s)	3. Monitor system usage, software and hardware, document problem areas in monitoring records, submit to parish assistant superintendent
Project Curriculum Specialists	4. Monitor system usage, software and hardware, document any observed problem areas in monitoring records, submit to parish assistant superintendent
Parish Assistant Superintendent	5. Monitor system usage, software and hardware, document any observed problem areas in monitoring records, submit to parish assistant superintendent
Parish Assistant Superintendent	6. Submit copies of all monitoring records to project curriculum specialists to insure any needed corrections in the software system

Activity Goal #8

To revise, as needed, and finalize the total software delivery system

Accomplished

All curriculum changes were completed and the software delivery system was de-bugged prior to April 1, 1987. Final data entry of all curriculum materials was not completed until late May, 1987.

Mathematics Software	Management Systems	Systems Document CWA-B
-------------------------	--------------------	---------------------------

SUBJECT: System for revising, as needed, and finalizing the total software system

Responsibility	Action
Project Curriculum Specialists	1. Review all monitoring records, assign changes to be made, if needed, to the various project specialists
Project Curriculum Specialists	2. Complete any needed curriculum changes
Project Measurement Specialists	3. Complete any needed measurement changes
Systems Analyst/Programmers	4. Complete any needed programming changes
Data Entry Specialists	5. Enter any needed software changes (steps 2-5) into software systems, edit
Project Curriculum Specialists/ Measurement Specialist/Systems Analyst	6. Try out software system, update documentation, finalize
Project Curriculum Specialists	7. Submit software system to parish assistant superintendent
Parish Assistant Superintendent	8. File master copies of software system

Activity Goal #9

To produce workable copies of the developed software for each purchased hardware configuration and one master copy for backup.

Accomplished

The East Carroll Adult Education Program has one working copy plus one backup copy of the developed software program. The software program contains 18 floppy disks and a user's manual.

FACTORS RELATING TO THE ATTAINMENT/NON-ATTAINMENT OF THE OBJECTIVES

As noted in the previous section, all project objectives were attained. However, the curriculum development, the development of the software authoring program, and the data entry of content into the authoring program required more time than was originally planned. Over 3000 mathematics exercises were developed in a multiple-choice format. Tutorial statements and a complete explanation of the problem solution were developed. This process was time consuming, as well as the process of entry.

The project objectives were attained but many working hours were devoted to the project. It may even be suggested that more time be requested should such a project be submitted in another discipline.

METHODOLOGY

The project was a developmental project. However, all developed mathematics exercises were "tried-out", or in other words, worked by several curriculum specialists to identify the most reasonable mistakes which became the alternate choices for the answer. Also, the solution of the problems was compared, and the most valid to fit the space limitation of the authoring program was used.

SUMMARY OF FINDINGS

A thorough development of curriculum content is a large task. In the present study, approximately 150 mathematics skills were identified and 3000 exercises developed. Each exercise was further examined as to most probable errors and a complete tutorial of "how to" was developed for each exercise. These materials have the potential for providing nearly an independent self paced instructional program. Utilized with a resource teacher, the program has the potential to be very successful.

RECOMMENDATIONS AND CONCLUSIONS

1. It is recommended that all programs engage in curriculum work to some degree. A staff that participates in this development will enhance their knowledge of content and learn many new approaches to the presentation of this course content.
2. It is recommended that all programs utilize computers for instruction. Computers are ideal for presenting instruction in individualized settings.
3. It is recommended that computer software utilized should contain tutorial features. These features present the "how-to" of problem solving in detail and enable the student to check on procedures as needed in the solving of the exercises.

After the completion of the East Carroll Mathematics Software Development Project, it is concluded that computer assisted instruction utilizing well developed tutorial software will increase the probability of adult education achievement in the mathematics content area.

LOUISIANA STATE DEPARTMENT OF EDUCATION P. O. BOX 44064 BATON ROUGE, LOUISIANA 70804		DE FORM 813-D	
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INSTRUCTIONS: An original and three signed copies are to be submitted within thirty days following termination of the project.		FISCAL YEAR OF AWARD 1986-87	
		PERIOD OF CONTRACT OR GRANT From 7/15/86 To 6/30/87	

PART I - EXPENDITURES	AMOUNT BUDGETED (a)	ACTUAL EXPENDITURES (b)	BALANCE (Col a minus Col b) (c)
A. DIRECT COSTS - ALL SOURCES			
1. PERSONNEL SALARIES	\$32,500.00		
A. PROJECT DIRECTOR		\$ -0-	
B. OTHER KEY PERSONNEL, IF ANY		31,500.00	
C. INSTRUCTIONAL STAFF AND COUNSELORS (No. Full Time i No. Part Time)		-0-	
D. CONSULTANTS (No.)		-0-	
E. SECRETARIAL AND CLERICAL (No.)		-0-	
F. OTHER SUPPORTING STAFF (No.)		-0-	
G. SUBTOTAL FOR PERSONNEL SALARIES	\$2,500.00	\$31,500.00	\$1,000.00
2. OTHER DIRECT OPERATING COSTS			
A. TRAVEL	\$ -0-	\$ -0-	\$ -0-
B. EQUIPMENT (Rentals and purchases)	2,000.00	1753.73	246.27
C. MINOR REMODELING OF SPACE	-0-	-0-	-0-
D. OTHER EXPENSES (SUM OF (1) THROUGH (6))	-0-	-0-	-0-
(1) REQUIRED FEES, IF ANY	-0-	(-0-)	
(2) EMPLOYMENT SERVICES AND BENEFITS	-0-	(-0-)	
(3) COMMUNICATION COSTS	-0-	(-0-)	
(4) SUPPLIES, PRINTING, AND PRINTED MATERIALS	-0-	(-0-)	
(5) RENTAL OF SPACE	-0-	(-0-)	
(6) UTILITIES AND CUSTODIAL SERVICES (If not included in any other item of this section and/or in indirect costs)	-0-	(-0-)	
E. SUBTOTAL - OTHER DIRECT OPERATING COSTS	\$4,500.00	\$3,253.73	\$1246.27
3. TOTAL DIRECT COSTS (Sum of Lines 1G and 2 E)	\$34,500.00	\$33,253.73	\$1246.27
B. COST SHARING			
1. CONTRIBUTIONS OF GRANTEE	\$ 2,400.00	\$2,400.00	\$ -0-
2. CONTRIBUTIONS FROM OTHER SOURCES	34,500.00	33,258.73	1246.27
3. TOTAL COST SHARING	\$36,900.00	\$35,653.73	\$1246.27
C. TOTAL STATE DIRECT COSTS (Line A3 minus line B3)	\$ 1,246.27	\$	\$
D. INDIRECT COSTS (Not to exceed 8 percent of Total State Direct Costs, Line C)			
E. TOTAL STATE FUNDS EXPENDED (Line C plus Line D)	\$	\$	\$

PART II - CASH SUMMARY	
A. TOTAL AMOUNT OF GRANT	\$34,500.00
B. TOTAL STATE GRANT FUNDS EXPENDED (Same as Part I, Line E, column b)	33,258.73
C. TOTAL GRANT FUNDS RECEIVED FROM STATE	34,500.00
D. BALANCE DUE CONTRACTOR OR GRANTEE AGENCY (or refund due State Government)	\$ 1246.27

I CERTIFY THAT ALL OF THE INFORMATION CONTAINED HEREIN IS CORRECT TO THE BEST OF MY KNOWLEDGE

SIGNATURE OF PROJECT DIRECTOR	DATE	SIGNATURE OF FISCAL OFFICER AUTHORIZED TO REPRESENT GRANTEE AGENCY	DATE
		R. E. Williams	

EXHIBIT D